

Taiwan's Role in the Global Supply Chain: Trends of Decentralization and Relocation, Challenges, and Prospects

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Abstract

Taiwan plays a vital role in the global supply chain, producing manufactured products ranging from textiles and garments to technology products, including semiconductors, doing so in numerous Taiwan-invested manufacturing facilities around the world. Under growing tensions between major countries and the COVID-19 pandemic, which have led to supply-chain restructuring, Taiwanese companies have considered, or have already, adopted a different investment strategy in China. In 2022, Taiwan's latest investment flows in China dropped to less than 40 percent of its global outbound investment, demonstrating a strategy of decentralization and relocation from China. The past five years have also witnessed a significant growth in Taiwan investment flows into Southeast Asia and the U.S. Under the changing external environment and a diversification strategy, TSMC, the world's largest semiconductor manufacturer, announced an investment plan in Arizona, which will begin production of 4-nanometer process technology in 2024. TSMC also announced investment plans in Fukumoto, Japan, and in August 2023, a joint venture in Dresden, Germany. These moves are in response to the national strategy of the U.S., the EU and Japan, and will help those countries secure access to semiconductors in the event of disruptions in the supply chain. Taiwan needs to collaborate with its like-minded partners to address various challenges; it therefore needs to be invited to join the supply chain networks proposed by major countries.

Keywords: Global Supply Chains, New Southbound Policy, Foreign Direct Investment, Indo-Pacific Economic Framework, Open Strategic Autonomy

I. Background

The global economy has in recent years experienced serious shocks resulting from a crisis in the global supply chain. Escalating U.S.-China trade tensions and the COVID-19 pandemic had an impact on most countries and paralyzed transportation of goods, logistics ecosystems, and manufacturing activity. The unforeseen paralysis has forced many countries, developed and developing alike, organizations, and corporations to rethink and address vulnerabilities in their globalized supply networks. Further contributing to disruptions in the supply of many critical goods, most notably semiconductors needed for producing automobiles and smartphones, is the fact that the manufacturing capacity of different parts of global supply chain is highly concentrated in China, making China either the single largest or among the key suppliers of many critical products and raw materials. Under a strategic policy change to enhance domestic manufacturing capacity, trends in the restructuring of global supply chain have been widely observed in the past years. This restructuring, including decentralization and relocation of supply chains from China and diversification or expansion to other countries or regions, is reshaping the global geopolitical and economic landscape.

Taiwan plays a vital role in the global supply chain, producing manufactured products ranging from textiles and garments to technology products such as semiconductors, notebook computers, smartphones and iPads, in numerous Taiwan-invested overseas manufacturing facilities across the globe. Growing tensions between the U.S. and China in recent years have raised the alarm among Taiwanese companies operating in China, which are increasingly concerned about their overdependence on the Chinese market. Therefore, like many multinational corporations that are beginning to review their business strategy toward the Chinese market, Taiwanese companies are also considering, or have already adopted, a different investment strategy in China. In 2022, Taiwan's investment flows into China dropped to less than 40 percent of Taiwan's global outbound investment, an indication that Taiwanese investment was shifting to other countries or regions.

Meanwhile, after President Tsai Ing-wen announced the launch of a New Southbound Policy (NSP) in 2016, Taiwanese businesses began showing greater

interest in Southeast Asia.¹ The countries under the NSP, particularly some Southeast Asian countries and India, have come to play an important role in the current supply chain decentralization and relocation. In 2022 and the first six months of 2023, Foreign Direct Investment (FDI) outflows to Southeast and South Asian countries increased to account for more than 30 percent of Taiwan's global outbound FDI. In addition, encouraged by incentives in U.S. trade policy and an improved economic partnership between the U.S. and Taiwan, FDI outflows to the U.S. also increased. Furthermore, the investment projects by the Taiwan-based TSMC, the world's largest chipmaker, are of strategic importance to both Taiwan and the U.S. in diversification and enhancing national strategic autonomy.



Figure 1. Taiwan Plays a Vital Role in the Global Supply Chain

Source: Depositphotos.

1 The NSP targets 10 Southeast Asian Countries, 6 South Asian countries, and Australia and New Zealand for enhancing economic collaboration. Ministry of Foreign Affairs, Republic of China (Taiwan), "NSP Countries," August 28, 2023, accessed, *New Southbound Policy Portal*, <<https://nspp.mofa.gov.tw/nspp/>>.

II. Taiwan in the Global Supply Chain and Its Changing Investment Strategy in China

1. Taiwan in the Global Supply Chain – Decentralization of China-Centered Manufacturing Networks Since 2018

Taiwan began developing an export-oriented manufacturing industry in the 1980s. Due to the small domestic market, Taiwanese companies have since then gradually adopted a unique model of OEM (Original Equipment Manufacturer), a contract-manufacturing model of manufacturing and producing products for international brand companies or large retailers. The OEM model, subsequently upgraded to the ODM model (Original Design Manufacturer), allowed international clients to outsource manufacturing to Asia and take advantage of the lower labor costs and abundant workforce. These business models have not only driven Taiwan's economic growth for over three decades, but have also elevated numerous Taiwanese companies in the global supply chain to a leading role.

Many manufacturing industries — textiles and apparel, automotive parts, and consumer electronics — are the sectors where Taiwan has played a significant role in the global supply chain. In order to remain competitive, Taiwanese companies have established overseas manufacturing facilities while keeping logistics and R&D at home. Most companies also maintain, for strategic reasons, manufacturing of the most value-added or latest technology in Taiwan.

According to statistics by Taiwan's Industrial Technology Research Institute (ITRI), Taiwan is the largest producer of servers, notebook computers, personal computers, printed circuit boards (PCBs) and fabrication and assembly, packaging and testing (APT) of semiconductors. In search of an abundant workforce and the most cost-effective operations, Taiwanese companies worked closely with international brand companies when they outsourced most manufacturing to China after it was admitted to the World Trade Organization (WTO) in 2001. According to FDI statistics released by the Investment Commission, under the Ministry of Economic Affairs (MOEA), since the early 2000s, Taiwan's outbound investment in China has increased significantly. In 2010, China accounted for about 85 percent of

Taiwan's total outbound FDI. In the meantime, China became the largest destination of manufacturing outsourcing activities. Taiwan-invested facilities in China produced more than 80 percent of products for the U.S.-based Apple Company, including Apple's iPhones, iPads, and Mac computers, among others.²

In 2017, then U.S. President Donald Trump launched 301 trade investigations against Chinese imports. The U.S. administration announced the imposition of 301 tariffs on Chinese imports starting in August 2018. This series of trade sanctions triggered a U.S.-China trade war that sparked a reconfiguration of the global supply chain. Some companies diversified their supply networks to avoid geographical concentration in China, while others decided to relocate from China to other countries to reduce their exposure to geopolitical risks.

According to the MOEA, Taiwan's outbound investment in China has gradually decreased in terms of amounts and share of total outbound FDI. Since 2010, when

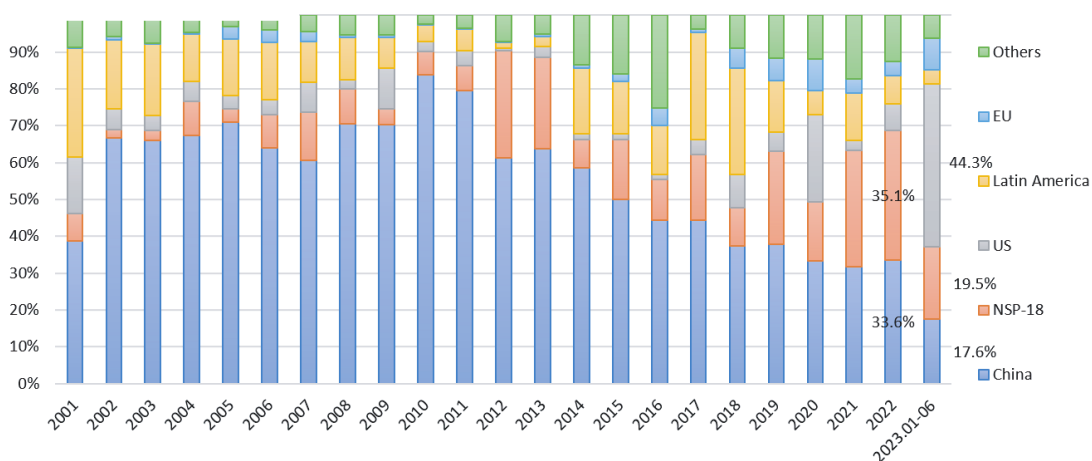


Figure 2. Share of Taiwan Outbound FDI by Destination

Source: Compiled by author using data from Investment Commission, Taiwan.

² Before current relocation trends, Apple Company had outsourced manufacturing of all its Mac computers to China, including its latest model of Mac Pro, which was the company's only major device assembled in the U.S.; manufacturing was also shifted to China in 2019.

the share of FDI in China reached its peak, both amounts and shares continued to decrease. Since 2019, investment flows in China decreased to under US\$5 billion, the lowest since 2002, while its share also declined to less than 40 percent since 2018. In the first six months in 2023, investment in Southeast Asia for the first time in two decades surpassed that in China, accounting for 35 percent.

According to a series of surveys of Taiwanese manufacturing companies in China conducted by Taiwan's National Confederation of Industries, from 2019 to 2022, China continued to be a major market, making it difficult for those companies to close or move their business or facilities to other countries. However, the surveys showed that more than 60 percent of responding companies had already expanded or planned to expand their manufacturing capacity to other countries, primarily to Southeast Asian countries. In the meantime, a majority of respondents stated that they were pessimistic about China's economic outlook for the next few years.³

On the other hand, according to previous similar surveys conducted by the American Chamber of Commerce in China and the European Chamber of Commerce in China, even under the COVID-19 pandemic in 2020 and the U.S.-China tensions since 2018, members reported increased revenue and profitability in the Chinese market and held positive views of the Chinese markets. However, the unexpected lockdowns in Shanghai and other cities in 2022 and a series of unfriendly legislation and measures against foreign companies in China indicated that China's central government was moving toward a less open and friendly foreign investment policy. The *2023 China Business Climate Survey (BCS) Report* published by AmCham China revealed that while member companies still see China as a priority market, their willingness to increase investment and strategic priorities are declining as a result of growing concerns over China's openness and business climate.⁴

3 馮鈺瓏, "Research on the Investment Trend and Industry Distribution of Taiwanese Firms in Mainland China," December 2021, *Mainland Affairs Committee, Taiwan*, <<https://ws.mac.gov.tw/001/Upload/295/relfile/7845/77546/9aea11db-98d1-4c3c-a84d-6d361c377e7a.pdf>>.

4 AmCham China, "2023 China Business Climate Survey Report," March 5, 2023, *AmCham China*, <<https://www.amchamchina.org/2023-china-business-climate-survey-report/>>.

One key concern for American companies is the National People's Congress passage of a revised *Counter-Espionage Law* in April 2023, an update of its 2014 version, which among other things bans the transfer of any information related to national security and broadens the definition of spying. The new legislation, which took effect on July 1, 2023, stipulates that all "documents, data, materials, and items related to national security and interests" are regarded the same as state secrets.⁵

The law came after China detained dozens of Chinese and foreign nationals on suspicion of espionage, increasing concerns of personal safety and freedom of speech for all companies and individuals in China. The changing attitudes in China, at least in the central government, are likely a contributing factor for the current supply chain relocation from China to other countries or regions.

2. Enhanced Trade Ties and Supply Chain Partnerships with NSP Countries

When President Tsai announced the New Southbound Policy in 2016, one of her objectives was to strengthen economic ties with Southeast and South Asian countries. During the past eight years since the NSP was launched, bilateral trade with NSP countries has increased from US\$110.6 billion in 2017 to US\$180.3 billion in 2022. The share by NSP countries of Taiwan's total trade also increased to around 19 percent in 2022. According to trade data by the Bureau of Foreign Trade, under the MOEA, in the past three years (2020-2022), export growth to NSP countries outperformed the Chinese market, registering a growth rate of 35.2 percent in 2021 and 17.3 percent in 2022, higher than the global growth rate of 29.3 percent and 7.4 percent, and the growth rate in China of 22.9 percent and -3.8 percent. (See Table 1)

5 The revised law allows Chinese authorities carrying out an anti-espionage investigation to gain access to data, electronic equipment, information on personal property and also to ban border crossings. Cyberattacks are also regarded as acts of espionage. The U.S. government, analysts and lawyers say that the revisions to Beijing's *Anti-Espionage Law* are vague and will give authorities more leeway in implementing already opaque national security legislation. "Fears for people and firms as China's new anti-espionage law comes into effect," *the Guardian*, Jun 30, 2023, <<https://www.theguardian.com/world/2023/jun/30/fears-for-people-and-firms-as-chinas-new-anti-espionage-law-comes-into-effect>>.

Table 1. Taiwan's Exports to China and Selected NSP Countries (2020-2022)

	Export (USD million)			Export Growth (%)		
	2020	2021	2022	2020	2021	2022
Global	345,136	446,385	479,451	4.9	29.3	7.4
China	102,447	125,904	121,114	11.6	22.9	-3.8
NSP 18	61,076	82,580	96,873	-3.2	35.2	17.3
ASEAN 10	53,218	70,245	80,617	-1.3	32.0	14.8
Singapore	19,084	25,719	29,523	4.9	34.8	14.8
Malaysia	9,459	13,328	17,019	0.6	40.9	27.7
Thailand	5,289	7,024	7,550	-4.1	32.8	7.5
Indonesia	2,277	3,070	3,215	-22.1	34.8	4.7
Philippines	5,646	6,073	7,640	-8.3	7.6	25.8
Vietnam	10,522	13,968	14,575	-2.3	32.7	4.3
India	2,595	4,523	5,319	-20.9	74.3	17.6

Source: Compiled by author using data from BOFT, MOEA, Taiwan.

Among NSP countries, investment-driven trade growth was particularly significant in Singapore, Vietnam, and India. Vietnam is the most popular investment destination and saw the largest expansion of manufacturing capacity by Taiwanese companies in recent years. In 2022, bilateral trade with Vietnam reached US\$21.5 billion, from US\$13.6 billion in 2017, making Vietnam Taiwan's 10th-largest trading partner. Bilateral trade with Singapore, Taiwan's 6th-largest trading partner, increased to US\$42.1 billion from US\$26.3 billion. India, thanks to its strong economic growth and increasing market potential in the past years, has also attracted more investment from Taiwan and developed stronger trade ties. In 2022, bilateral trade with India increased from US\$6.3 billion in 2017 to US\$8.5 billion.

Taiwan's FDI outflows in Southeast Asia and India have also risen significantly since 2018, resuming Taiwan's ranking as one of the top foreign investors in those countries. According to the MOEA, Taiwan's FDI flows in five NSP countries — Vietnam, Thailand, Malaysia, Indonesia and India — reached US\$8.1 billion from 2018 to 2022. The amounts were even larger and reached US\$12.7 billion, according to data released by those countries. Taiwan's FDI stock in these five countries reached US\$75.2 billion, and is expected to create more than 5 million jobs in the combined

manufacturing facilities.⁶

Such trends have significant implications on Taiwan-ASEAN and Taiwan-India economic relations, fostering stronger supply chain partnerships with some of these countries. For example, increasing Taiwanese FDI flows in the electronics and Information and Communication Technology (ICT) sector in Vietnam have contributed hugely to Vietnam's rise as an emerging Asian factory in manufacturing smartphones and notebook computers. Furthermore, Taiwan contract manufacturers for Apple Co. are relocating parts of their iPhone and iPad supply chains from China to North Vietnam and India, paving the way for Vietnam and India to participate for the first time in the Apple supply chains.

These trends also raised Taiwan-U.S. bilateral relations to new heights. Bilateral trade with the U.S. increased from US\$65.2 billion in 2017 to US\$120.5 billion. Taiwan's trade surplus with the U.S. also increased from US\$8.4 billion to US\$29.6 billion. Furthermore, the U.S. became Taiwan's second-largest investment destination, only after China, and FDI to the U.S. continued to hit records.

III. Taiwan and the Reconfiguration of the Semiconductor Supply Chain Among G7 Countries

The disruptions in semiconductor supplies in the past two years had a severe impact on industries such as automobile and consumer electronics products. The U.S. was a leader in the semiconductors industry, producing more than 30 percent of global supplies in the 1990s. However, as most American companies had outsourced manufacturing to Asia, other American companies also outsourced manufacturing, assembly, packaging and testing of semiconductors to Asia, while concentrating on IC design and R&D at home. As a result, the U.S. was greatly hit in the past two years by the global shortage of semiconductors.⁷

⁶ According to informal estimation by Taiwan's Representative Offices in Vietnam and Indonesia, Taiwanese companies employ around 1.5 million and 1 million workers in Vietnam and Indonesia respectively.

⁷ Kristy Tsun-Tzu Hsu, "Taiwan as a Partner in the U.S. Semiconductor Supply Chain," September 2022, *Wilson Center*, <https://www.wilsoncenter.org/sites/default/files/media/uploads/documents/2022-09_Taiwan_SemiconductorSupplyChain_Hsu.pdf>.

On February 24, 2021, U.S. President Joe Biden signed Executive Order (E.O. 14017) to assess the country's supply chain vulnerabilities. The assessment identified four strategic sectors – semiconductor manufacturing & advanced packaging, large capacity batteries, critical minerals & materials, pharmaceuticals & Active Pharmaceutical Ingredients (API) – in need of strategic policy adjustments. The report identified advanced semiconductor manufacturing and testing and packaging among the critical technology sectors for the U.S., and concluded that the administration needs to address the issues and improve the resilience of supply chains in order to maintain and strengthen its innovative leadership and rebuild productive capacity in key sectors and value chains. According to SEMI and other reports, more than 80 percent of semiconductors are produced in East Asia; and 100 percent of advanced semiconductors are produced in two countries – 92 percent in Taiwan and 8 percent in South Korea.

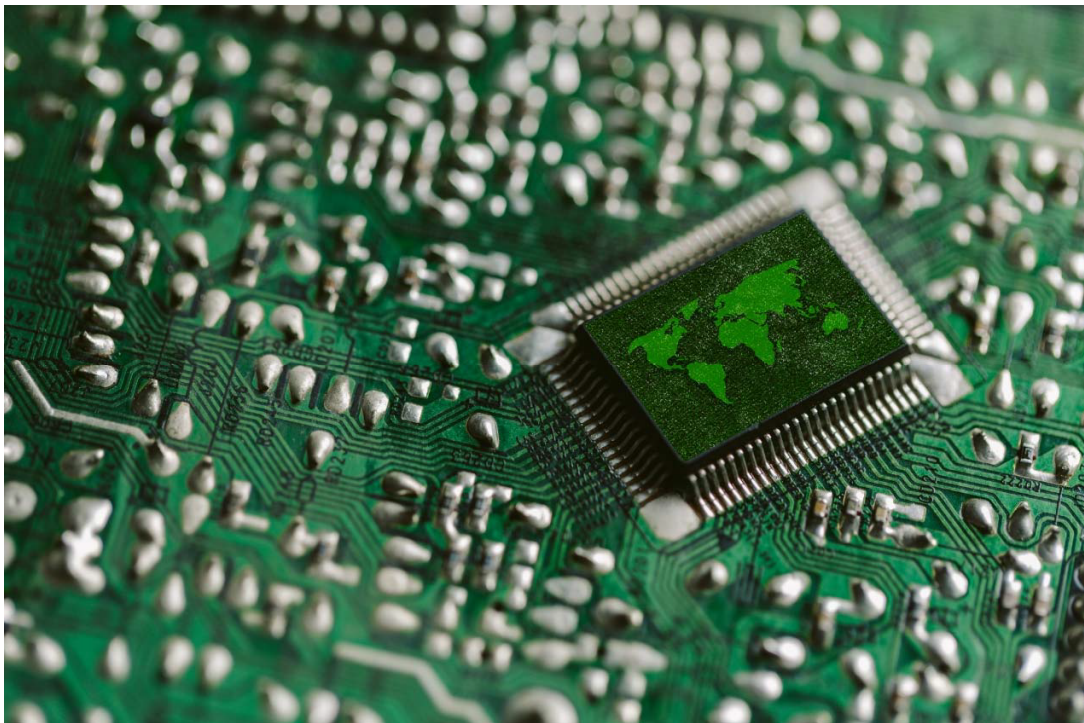


Figure 3. The Global Shortage of Semiconductors

Source: Depositphotos.

Similarly, the European Union also adopted a series of policies to improve its Open Strategic Autonomy (OSA) and identified six critical sectors essential to the EU's national security and economic resilience. The six critical sectors include semiconductors, critical minerals, Active Pharmaceutical Ingredients (API) and high computing. The EU aims to improve the autonomy of these critical sectors by building domestic manufacturing capacities.

Like the U.S. in the semiconductor supply chain, the EU plays a key role in advanced IP design and key semiconductor equipment and tools and wafer raw materials, but it lacks semiconductor manufacturing and has little capacity for APT. In December 2020, the EU released a Joint Declaration on Processors and Semiconductor Technologies with the aim of bolstering Europe's electronics and embedded systems of value chains. EU Commission President Ursula von der Leyen also introduced

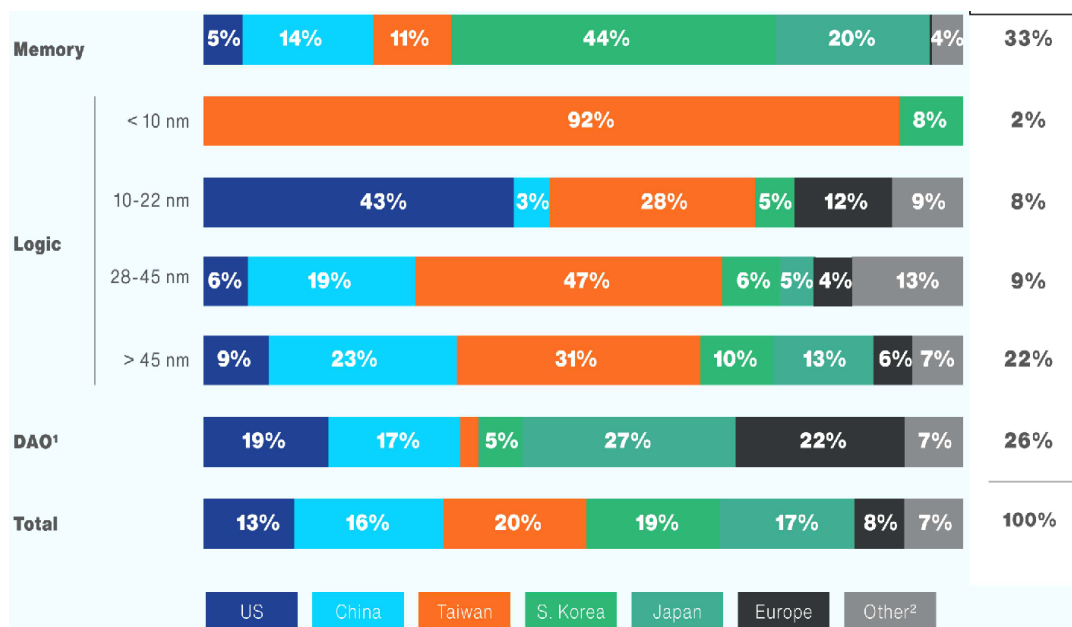


Figure 4. Breakdown of Global Wafer Fabrication Capacity by Region, 2019 (%)

- Note: 1. Discretes, analog and optoelectronics and sensors.
- 2. Other includes Israel, Singapore and the rest of the world.

Source: Antonio Varas, Raj Varadarajan, Ramiro Palma, Jimmy Goodrich, & Falan Yinug, "Strengthening the Global Semiconductor Supply Chain in an Uncertain Era," April 1, 2021, BCG, <<https://www.bcg.com/publications/2021/strengthening-the-global-semiconductor-supply-chain>>.

the *European Chips Act*, aiming to increase the EU's share of global semiconductor production from 9 percent in 2019 to 20 percent by 2030. To achieve this goal, EU governments and European companies will need to invest more than 43 billion euros to develop semiconductor supply chains. In addition, finding qualified labor and talents and building constructive relations with trade unions will be challenging.

In Asia, Japan also announced in mid-2021 that it will invest US\$8 billion in state funds to support a domestic semiconductor supply chain. In July 2022, the Japanese Diet passed legislation to provide subsidies to private sector investment in the semiconductor industry.

As manufacturing costs of semiconductors are much higher in the U.S., Europe and Japan than in Taiwan or other Southeast Asia, governments from these countries have adopted a more active intervention policy by providing national subsidies and other incentives in order to attract leading companies, such as Taiwan's TSMC, to build manufacturing facilities in their countries. However, generous state subsidies from advanced countries have already triggered a race for government funds and thus further contributed to inflation.

Taiwan started developing its semiconductor industry in the late 1970s, when the government tried to promote a transformation of vertical integration of its consumer electronics manufacturing activities so that semiconductors could be domestically sourced. The goal was to localize the manufacturing of semiconductors and its downstream services in order to support its consumer electronics industry. Over the past decades, securing domestic semiconductor supply has been instrumental to the ICT and electronics industries. It also strengthened Taiwan's leadership role in manufacturing smartphones, notebook computers, printed circuit boards, data center servers, and dozens of other products.

As of 2022, around 310 Taiwanese companies are involved in IC design, fabrication, assembly, packaging, and testing, with a total of 320,000 employees. Taiwan not only ranks No. 1 in the world in fabrication, it also ranks No. 2 in IC design, as well as in assembly, packaging, and testing. Besides the 310 companies mentioned above, hundreds of thousands of suppliers of raw materials, equipment,

Table 2. Profiles of Taiwan Semiconductor Sectors (2022, 2021)

Sub-Sectors/ Layers		No. of firms	Revenue NT\$100 million*	Share in Global Market	Global Ranking	No. of employees	No. of R&D Staff
Total	2022	312	48,370 (+18.5%)	--	2	320,398	60,221
	2021	314	42,495 (-12.1%)		2	318,374	61,567
IC Design	2022	262	12,320 (+1.4%)	20.8	2	54,091	39,378
	2021	262	10,760 (-12.7%)	21.3	2	56,450	41,610
Wafer Manuf. Fabrication	2022	15	29,203 (+31.0%)	77.60%	1	120,788	13,992
	2021	15	26,060 (-18.0%)	77.90%	1	134,412	14,496
Assembly, Packaging & Testing (APT)	2022	37	6,847 (+7.3%)	53.9	1	145,419	6,851
	2021	37	5,675 (-17.1%)	52.6	1	137,512	5,461

Note: The average exchange rate of US dollars to Taiwan dollars in 2021 and 2022 is around \$ 1= 29 and \$ 1= 30 New Taiwan dollars respectively.

Source: Compiled by author using data from IEK, Taiwan.

machinery, components and parts are also involved in this ecosystem. These companies form close supply chain partnerships that are rarely if ever seen in other countries, underscoring Taiwan's unique role in the global semiconductor supply chain.

Established in 1987, TSMC is the world's largest semiconductor manufacturer, with the annual combined capacity of its manufacturing facilities exceeding 15 million 12-inch equivalent wafers. In 2022, it produced more than 30 percent of the global semiconductor supply, and more than 80 percent of the advanced semiconductors. TSMC contract manufactured more than 13,000 products for various applications, covering end markets ranging from high-performance computing, smartphones, the Internet of Things (IoT), the automotive industry, and digital consumer electronics.⁸

⁸ In 2022, TSMC manufactured 12,698 products for 532 customers for various applications covering high-performance computing, smartphones, the Internet of Things (IoT), automotive, and digital consumer electronics, in the end markets. TSMC, "Company Info," August 28, 2023, accessed, TSMC, <https://www.tsmc.com/english/aboutTSMC/company_profile>.

Most of Taiwan's manufacturing capacity is located in Taiwan, thanks to the super cost-effectiveness of its ecosystem. Though serving more than 500 customers across the globe, TSMC retains more than 80 percent of its manufacturing facilities in Taiwan. The company has nine factories in Taiwan, two in China, and one in Singapore.⁹ In May 2020, TSMC announced an investment plan in Arizona, which will begin production of N4 process technology in 2024, with a monthly production of 20,000 pieces. In December 2022, TSMC further announced it has started construction of a second fab, which is scheduled to begin production of 3nm process technology in 2026.

In 2020, TSMC announced an investment plan in Fukumoto, Japan, in collaboration with Sony Co., to produce semiconductors for the Japanese market. The plan aims to produce 28 nm chips for Sony, with production targeted for 2024. According to Japanese media, the company was the first foreign investor to successfully apply for a subsidy worth of US\$ 3.5 billion in Kumamoto.

On August 8, 2023, TSMC announced a plan to invest in a joint venture in Dresden, Germany, to produce 28 nm chips for the automotive sector.¹⁰ The joint venture, named European Semiconductor Manufacturing Company (ESMC) GmbH, or ESMC, will build a 300mm fab to support the future capacity needs of the fast-growing automotive and industrial sectors, aiming to begin construction in 2024 and begin production by the end of 2027.

⁹ These facilities include four 12-inch wafer GIGAFAB® fabs, four 8-inch wafer fabs, and one 6-inch wafer fab – all in Taiwan – as well as one 12-inch wafer fab at a wholly owned subsidiary, TSMC Nanjing Company Limited, and two 8-inch wafer fabs at wholly owned subsidiaries, WaferTech in the U.S. and TSMC China Company Limited.

¹⁰ The planned joint venture will be 70% owned by TSMC, while Bosch, Infineon, and NXP each holds 10% equity stake, subject to regulatory approvals and other conditions. Total investments are expected to exceed 10 billion euros consisting of equity injection, debt borrowing, and strong support from the EU and German government. TSMC, Robert Bosch GmbH, Infineon Technologies AG, & NXP Semiconductors N.V., “TSMC, Bosch, Infineon, and NXP Establish Joint Venture to Bring Advanced Semiconductor Manufacturing to Europe,” August 8, 2023, *TSMC*, <<https://pr.tsmc.com/english/news/3049>>.

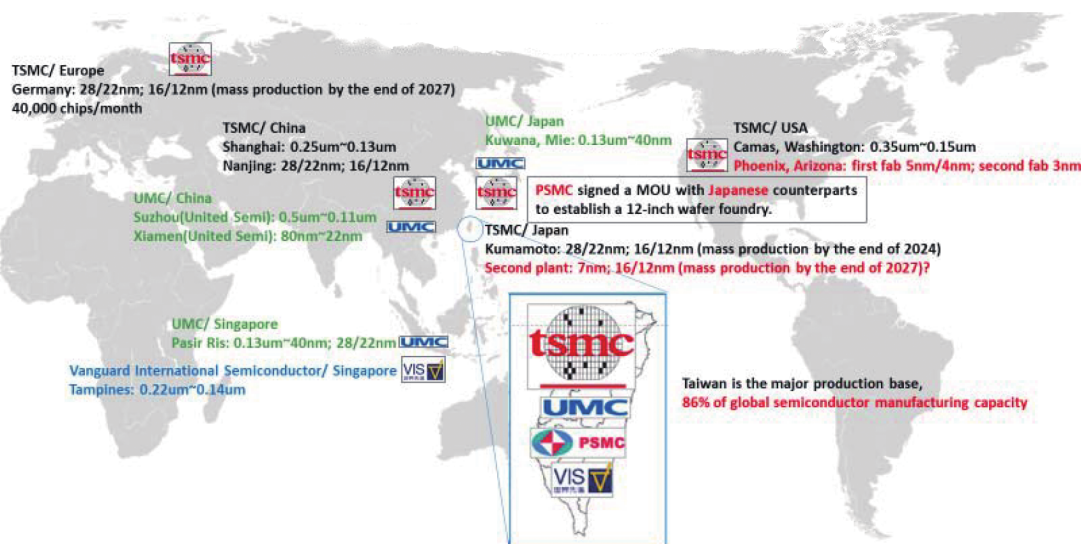


Figure 5. Map of TSMC's Manufacturing Facilities (2023)

Source: MIC and TSMC, including facilities under construction or investment plans.

In 2019, the EU accounted for only 9% of world production of semiconductors, a major drop from the 1990s, when the EU had a strong production capacity, which it progressively lost to Asia. The EU Commission has passed the *European Chips Act*, aiming to bring back capacity to Europe so that its member states will not be dependent on Asian and American counterparts. TSMC's €10 billion investment decision received a positive response from the Commission, agreeing in principle to provide a national subsidy up to 50 percent of its planned investment amount.¹¹

TSMC's recent investment plans in the U.S., Japan and Germany reflect the company's changing strategy to go global and secure new markets. It has been

¹¹ In March 2023, the European Commission announced it would relax state aid rules so member states had more leeway to co-invest with private actors on projects that further the green transition and reinforce the EU's industrial independence. Such investments in the semiconductor sector include a €30 billion plan by Intel in Saxony-Anhalt, with €10 billion from state aid, and STMicroelectronics and GlobalFoundries in France with government funding of €2.9 billion. Théo Bourgery-Gonse, "Breton: TSMC chip factory investment marks 'culmination' of EU industrial strategy," *EURACTIV*, August 10, 2023, <<https://www.euractiv.com/section/industrial-strategy/news/breton-tsmc-chip-factory-investment-marks-culmination-of-eu-industrial-strategy/>>.

reported that TSMC has already successfully invited some of its key suppliers to invest as “neighbors” to directly support its operations. These facilities will contribute to the countries’ open strategic autonomy by increasing the local manufacturing capacity of either advanced or matured chips to support their industries. It also marks a significant milestone for Taiwan’s collaboration with G7 countries to enhance their domestic supply chains of semiconductors. However, it is still a long way before an ecosystem can be fully developed in those countries. The main challenges ahead include expensive manufacturing and operational costs, a shortage of experienced workers, and strict labor laws, among others.¹²

IV. Taiwan Should Be Included in Global Supply Chain Networks

Amid the current restructuring of the global supply chain, both the U.S. and EU have identified semiconductors, batteries for electric vehicles, critical raw materials and minerals, among others, as priority sectors for re-shoring or the building of domestic manufacturing capacity. To enable the operations of the newly built supply chains, it is very important for like-minded countries or partners to work together and build partnerships for such strategic policy goals.

Such collaboration includes the Chip 4 alliance, which was first proposed by President Biden in February 2022. The Chip 4 includes the U.S., Japan, South Korea and Taiwan, which will collaborate in the semiconductor supply chain, including the establishment of an early warning system and exchange of information related to the supply chain. President Biden also launched the Indo-Pacific Economic Framework, or IPEF, in May 2022, and has invited like-minded partners in the Indo-Pacific to form an alliance for economic cooperation. The IPEF members include South Korea, Japan, Australia, India, Thailand, Malaysia, Indonesia, Vietnam, the Philippines, Singapore, Brunei, New Zealand, and Fiji. The IPEF has four pillars, including trade,

¹² TSMC announced in July that it will delay US chip fab opening due to US talent is insufficient. It was also reported that a trade union in Arizona tried to bar TSMC’s requests for sending Taiwanese engineers to work on building the factory. Ashley Belanger, “TSMC delays US chip fab opening, says US talent is insufficient,” July 21, 2023, *Ars Technica*, <<https://arstechnica.com/tech-policy/2023/07/tsmc-delays-us-chip-fab-opening-says-us-talent-is-insufficient/>>.

supply chains, infrastructure and de-carbonization, and last but not least, tax and anti-corruption. In August 2022, the Biden administration launched trade negotiations on each of the four pillars, aiming to conclude separate agreements.

On September 8, 2023, the USTR released the draft text of the IPEF for Prosperity Agreement Relating to Supply Chain Resilience. One of the key functions of the Agreement is to establish a Supply Chains Council among the participating countries and a supply chain crisis response network to coordinate policy resolution in the event of a supply chain crisis. Other functions include business match-making, joint procurement, identifying alternative shipping or air routes, and providing a green light to expedite the flow of goods within 15 days in the event of a supply chain crisis. According to the text, the Agreement will take effect after five out of the existing participating countries complete their domestic ratification process.



Figure 6. G7 Summit 2023 in Hiroshima, Japan

Source: G7, “Visit to Itsukushima Shrine,” May 19, 2023, *G7 Hiroshima 2023*, <<https://www.g7hiroshima.go.jp/en/photos/#>>.

Such collaboration in the supply chain also extends to the upstream side, the supply of critical raw materials and minerals. On May 20, 2023, the G7 held its annual Summit in Hiroshima, Japan. The G7 members discussed and reaffirmed the growing importance of critical minerals in various fields, especially for the global clean energy transition, and the need to manage economic and security risks caused by supply chain bottlenecks. G7 members announced the creation of various critical minerals networks or clubs to support each other in the event of a supply chain crisis or disruption.¹³

Apart from various networks in critical minerals, the U.S. and the EU have created a bilateral network — the U.S.-EU Trade and Technology Council (TTC).¹⁴ The Working Group on Secure Supply Chains addresses the supply chains issues, which also includes critical minerals and raw materials.

Taiwan is a member of the Chip 4 alliance, but was not invited to the IPEF nor any of the other networks of supply chains collaboration or clubs of critical minerals. After Taiwan was rejected by the IPEF due to political concerns expressed by certain IPEF members, the Biden administration announced the launch of the U.S.-Taiwan Initiative on 21st Century Trade, which addresses most of the main issues covered in the IPEF framework. The first agreement under the trade Initiative was signed on June 1, 2023.¹⁵

The agreement contains eight chapters, including customs administration and trade facilitation, good regulatory practices, development and administration of services authorization measures (services domestic regulation), anticorruption,

¹³ G7, “G7 Hiroshima Leaders’ Communiqué,” May 20, 2023, *G7 Hiroshima 2023*, <https://www.g7hiroshima.go.jp/documents/pdf/Leaders_Communique_01_en.pdf>.

¹⁴ The TTC established 10 Working Groups, which are chaired by relevant U.S. agencies and European Commission services.

¹⁵ Office of the United States Trade Representative, “Agreement between the American Institute in Taiwan and the Taipei Economic and Cultural Representative Office in the United States Regarding Trade between the United States of America and Taiwan,” June 1, 2023, *USTR*, <<https://ustr.gov/sites/default/files/US-Taiwan%20Initiative%20on%2021st%20Century%20Trade%20First%20Agreement%20-%20June%202023.pdf>>.

and small and medium-sized enterprises. While not a free-trade agreement and without provisions for market access, the agreement is an important milestone in bilateral relations between the U.S. and Taiwan, with improvements in trade policy coordination, the removal of non-tariff barriers and the facilitation of mutual investment.

Still, Taiwan's exclusion from regional groups could create serious blind spots on economic development and resilience of the whole supply chain. For example, as the world's largest producer of semiconductors, if Taiwan continues to be excluded from clubs such as lithium or rare earths, Taiwan's imports of raw materials or intermediate goods needed for manufacturing semiconductors may be disrupted. Taiwan's secured access to the minerals critical for manufacturing or testing and packaging is indispensable for the smooth functioning of the global supply chain. A supply chain without Taiwan's participation will either be incomplete or not cost-effective.

It is also important to note that while Taiwan holds a leadership role in the manufacturing industry, being a small economy with very limited natural resources, Taiwan's economic development is threatened by the current trade protectionism and resource nationalism. According to the U.S. and the EU review of strategic autonomy, critical minerals will be the next area for power competition and geopolitical tensions, especially the critical minerals of which China holds a significant share of the global reserves, such as lithium and some rare earths essential in producing semiconductors and batteries for EVs. To avoid a scenario in which China "weaponizes" these critical minerals, both the U.S. and the EU should invite all like-minded countries or partners as alliance partners. Taiwan can contribute more than is expected and should not become a missing piece.

